بسم الله الرحمن الرحيم

Recent trends in Diagnosis & Treatment of Choroidal tumours

Essay
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By

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الاساليب الحديثة في تشخيص وعلاج اورام الغلاف المشيمي للعين

رسالة
تمهيدا للحصول علي درجة الماجستير
المقدمه من الطبيبة

رشا عبدالمنعم محمد صديق
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Content

List of abbreviations

AA: Ancorative acetate.
AF: Autofluorescence.
ARM: Age related maculopathy.
ARMD: Age related macular degeneration.
APC: Antigen presenting cells
CEA: Carcino-embryonic antigen.
CM: Choroidal melanoma.
CNS: Central nervous system.
CNV: Choroidal neo-vascularization.
COMS: Collaborative ocular melanoma study.
Cox-2: Cyclo-oxygenase 2.
CT: Computerized tomography.
DC: Dendritic cells.
DSG: Melanoma disease site group.
DHE: Dihaemato-porphyrin esters, ethers.
EBRT: External beam radiation therapy.
ELISA: Enzyme linked immunosorbent assay.
FAF: Fundus autofluorescence.
FGF: Fibroblast growth factor.
FTA: Flourescine treponema antibody.
Gy: Gray.
GyE: Gray equivalent.
HDR: High dose rate.
HLA: Human leucocytic antigem.
HPD: Haemato-porphyrin derivative.
IBT: Iodine^{125} brachytherapy,
ICG: Indocyanine green.
ICGA: Indocyanine green angiography.
IFN: Interferon.
IL: Interleukin.
LAK: Lymphokine activated killer cells.
LDH: Lactate dehydrogenase.
MHC: Major histocompatibility complex.
MRI: Magnetic resonance imaging.
PBMC: Peripheral blood mono-nuclear cells.
PBRT: Proton beam radiotherapy.
PCR: Polymerase chain reaction.

Pd: Pallidum.
PDT: Photo-dynamic therapy.
PEBC: Program in evidence based medicine.
PEDF: Pigment epithelium derived factor.
PET: Position emission tomography.
PET/CT: Position emission tomography / Computed tomography.
RPE: Retinal Pigment Epithelium.
Ra P^{32}: Radioactive phosphorus uptake.
RRD: Rheumatogenous retinal detachment.
RT-PCR: Real time-Polymerase chain reaction.
Ru: Ruthenium.
Sr: Strontium.
STR: Stereotactic radiation.
TA: Triamcinolone acetonid.
TAM: Tumour associated macrophage.
TIL: Tumour infiltrating lymphocyte.
TNF: Tumour necrosis factor.
TSP: Thrombo-spondin.
TTT: Transpupillary thermo-therapy.
VDRL: Venereal disease research laboratory.
VEGF: Vascular endothelial growth factor.
WST: Water-soluble tetrazolium.

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Anatomy of the choroid

The choroid is a thin brownish membrane composed of blood vessels, melanocytes and connective tissue. It extends from the optic disc to the ora serrata forming the posterior part of the uveal tract. It is thicker at the posterior pole (0.2 - 0.3 mm) than in the periphery (0.1 - 0.15 mm). The choroid has racial variations being darker in pigmented races; while the choroidal vessels are easily seen in the white races. There is a potential space between the choroid and inner sclera termed suprachoroidal space ***(Easty & Sparrow; 1999).***

The choroid has four microscopic layers; lamina suprachoroidea (lamina Fusca), stroma containing vessels, chorio-capillaries and Bruch's membrane. Lamina suprachoroidal (lamina Fusca) is composed of closely packed lamellae that consist of delicate mesh of collagen fibres. These lamellae adjoin potential space which becomes evident when the suprachoroid is pathologically distended by serous fluid or blood. They are more adherent to each other and to the sclera posteriorly. Hence, detachments of the choroid takes place anteriorly and rarely pass behind the equator. The suprachoroidal space is traversed by the long and short ciliary arteries and nerves which supply the uveal tract ***(Bron et al; 1997).***

The stroma consists of an outer large vessel layer (Mailer's) and medium vessel layer (Sattler's). Arteries in Mailer's layer have an internal elastic lamina and smooth muscle media while the Sattler's layer shows many interlinked and intertwined vessels that lack fenestrations. There are inter-arteriolar and intervenous anastomoses particularly at the posterior

pole. Choroid arterioles supply the chorio-capillaries, but are not truly endarteries because of these anastomoses. In addition to vessels; the stromal layer contains nerves, cells and connective tissue. The stromal cells include melanocytes, fibrocytes, macrophages, mast cells and plasma cells ***(Easty & Sparrow; 1999).***

Melanocytes give the stroma its brown colour. Their numbers vary regionally with age and race; they are most numerous around the optic disc, less so in the periphery and predominate around vessels. They have no nucleoli but rich in melanosomes that contain fine and oval pigment granules, yellowish to dark brown in colour. Size of pigment granules is constant in any individual or cell but varies from race to race. Fibrocytes processes intermingle with those of the melanocytes. They are most dense in the outer choroid, and are more numerous in males. The collagen fibres of the stroma encircle vessels to provide an adventitia ***(Yanof & Fine; 1996).***

The layer of the chorio-capillaries consists of wide diameter capillaries; present internal to the arterioles and venules of Sattler's layer and external to Bruch's membrane. The chorio-capillaries are thin walled and have many fenestrations on the retinal aspect. Electron microscopy has failed to show the existence of any capillary muscular sphincter, unlike capillary beds elsewhere in the body. They are flattened antero-posteriorly providing a large surface area for unimpeded metabolic exchange across Bruch's membrane ***(Easty & Sparrow; 1999).***

Bruch's membrane (Lamina vitrea) is a thin, acellular, well-delineated zone lying between the retina and choroid. It is thickest near the

disc (2-4 μm) and is an integral part of the choroid anatomically. Bruch's membrane has five layers on electron microscopy; basement membrane of retinal pigment epithelium, inner collagenaus zone, middle elastic zone, outer collagenous zone and basement membrane of the chorio-capillaries ***(Easty & Sparrow; 1999).***

Blood supply of the choroid arises from posterior ciliary branches of the ophthalmic artery and is separate from the retinal circulation. The short ciliary arteries, after piercing the sclera, are at first in the suprachoroid surrounded by pigmented tissue. They proceed forwards in a sinuous manner and gradually penetrate the choroid. They bifurcate dichotomously and eventually divide into the chorio-capillaries, the capillary bed of the choroid extending from optic disc margin to the ora serrate. The arteries are less sinuous than the veins. Branches from the short posterior ciliary arteries, lying in the center (Haller's) layer, give rise to the choroidal arterioles of the intermediate layer (of Sattler). The anterior part of the choroid is either supplied by the recurrent ciliary arteries which arise in the ciliary body from circulus iridis major or from the long posterior and anterior ciliary arteries before they join the muscular circles. The venous drainage of the entire choroid is by vortex veins that subsequently drain in the superior and inferior orbital veins which exit the orbit through the superior and inferior orbital fissures ***(Bron et al; 1997).***

Nearly twenty short posterior ciliary nerves innervate the choroid. They originate from the ciliary ganglion and pierce the posterior sclera 3 to 4 mm from the optic nerves to enter the suprachoroidal space, where they lose their myelination. Extensive plexuses exist in the suprachoroid and choroid. Axons terminate in the subcapillary layer and not in the chorio-

capillaries. They provide sensory, motor, and sympathetic fibres. The two long posterior ciliary nerves innervate the anterior part of the choroid, but are largely providing the sympathetic supply to the dilator pupillae. Blood flow through the choroid is under autonomic control, via sympathetic fibres of the short posterior ciliary nerves ***(Bron et al; 1997).***

The main function of the choroid is to supply the outer layer of the retina with blood and nutrients. It is also thought that blood flow in the choroidal arteries assists in regulating intraocular pressure. It might be noted that epithelial cells act as a barrier controlling the movements of choroidal tissue fluid into the retina. The large number of pigment cells in the choroid absorbs excess light that penetrate the retina, thus preventing reflection ***(Easty & Sparrow; 1999).***

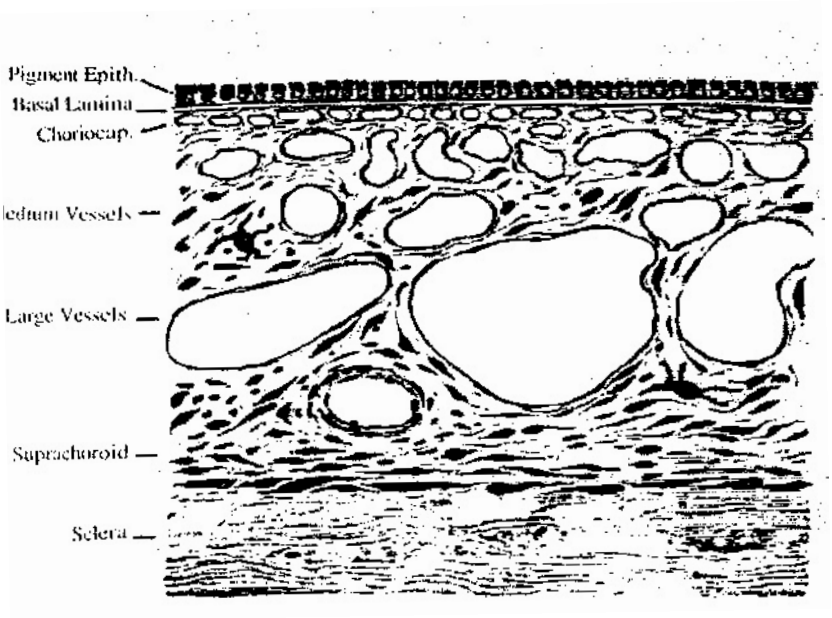

Figure (1): Section in the choroid

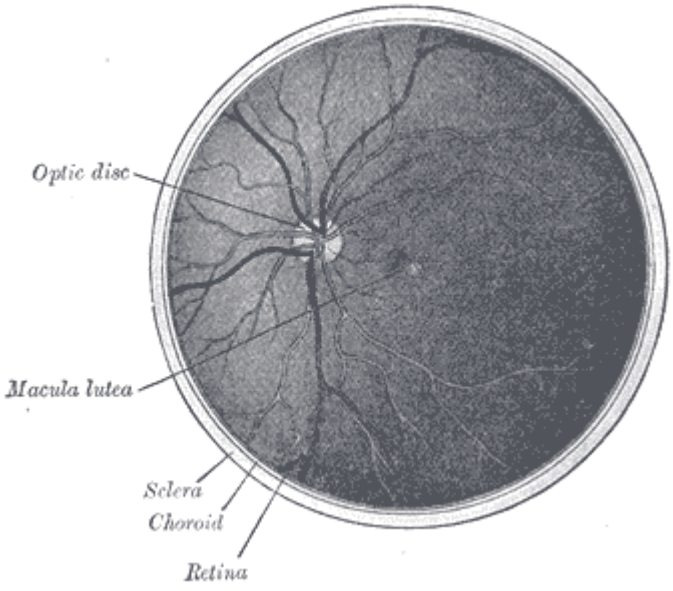

Figure (2): Interior of the eye